ELECTRIC AND MAGNETIC FIELDS (EMFs)

HEALTH AND EMF EXPERT'S

CONSENSUS STATEMENT

MANITOBA CLEAN ENVIRONMENT COMMISSION

March, 2001

HEALTH AND EMF EXPERT'S CONSENSUS STATEMENT ON THE HUMAN HEALTH EFFECTS OF EXTREMELY LOW FREQUENCY ELECTRIC AND MAGNETIC FIELDS

AS DEVELOPED DURING THE MANITOBA CLEAN ENVIRONMENT COMMISSION EXPERTS WORKSHOP WINNIPEG, MANITOBA, JANUARY 25, 2001

1. The production of electric and magnetic fields (EMFs) is associated with the generation, transmission and use of electricity. People are exposed to these fields not only when they are near high voltage lines, but also at their places of work and in their homes. Such fields are produced by distribution lines, transformers, building and house wiring and by all devices that use electric power.

2. Studies to investigate the potential health effects of these fields have been performed around the world for more than 30 years. Such research has included laboratory studies of cells, tissues and animals, as well as studies of human exposure in epidemiological studies.

3. The weight of scientific evidence does not support the conclusion that extremely low frequency EMFs such as those produced by power lines are a cause of adverse effects on human health.

4. Research to date[1] has not confirmed any biophysical mechanisms that would link properties of power and frequency fields to the initiation or promotion of cancer or any other adverse effect on human health.

5. Recommended exposure limits to prevent acute health effects at high levels of exposure have been put forward by members of the International Commission on Non-Ionizing Radiation Protection (ICNIRP)[2]. ICNIRP has not determined that chronic exposures at lower exposure levels are adverse. As recommended by the European Commission, member jurisdictions are to implement these ICNIRP exposure limits on EMF with the proviso that the ICNIRP recommendations apply "to relevant areas where members of the public spend significant time."[3] Currently available information on health and bioeffects of extremely low frequency fields does not provide a basis for establishing more restrictive exposure limits.

6. The Federal Provincial Territorial Radiation Protection Committee (FPTRPC) should continue to monitor the results of new studies, to re-assess their position in 2001 and in the future as new information becomes available, and to keep the Province of Manitoba apprised of their progress through the FPTRPC representative in Manitoba.

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[1] Refer to Clean Environment Commission EMF Workshop Report (2001). Also to the Council of the American Physical Society – (85/04/22).

[2] ICNIRP Guidelines "Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHX)," Health Physics, Vol. 74, No. 4, pp. 494-522, April 1998. The guidelines recommend a limit of 4.16 kV/m and 83.3 μT (833 milligauss) for 24-hour exposure of the general public.

[3] EU (European Union): COUNCIL RECOMMENDATION of 12 July 1999 On the Limitation of Exposure of the General Public to Electromagnetic Fields (0 Hz to 300 GHz) (1999/519/EC). Official J. Eur. Comm. L199:59-70(1999).

BACKGROUND

On November 15, 2000, the Manitoba Clean Environment Commission (CEC) received a request from the office of the Minister responsible for Manitoba Hydro to undertake an investigation of the potential human health-related effects that might be associated with electric and magnetic fields (EMF) as emitted from transmission and distribution lines. This investigation was also to include a review of the practices and policies adopted in other Canadian jurisdictions in responding to public concerns related to EMF exposure.

Responding to this request, the Commission convened an Experts Workshop to provide a forum in which to discuss the human health effects of EMFs and to determine if any conclusions could be drawn from the extensive studies and research that has been conducted respecting this issue over the past 30 years. This Workshop, which was held in Winnipeg on January 25, 2001, involved several public health officials and EMF experts (hereafter the Experts). In addition, the Workshop was attended by three Commission members, including the CEC Chairman, along with representatives from both Manitoba Hydro and Manitoba Conservation who served as a technical resource to the Workshop.

WORKSHOP PARTICIPANTS

Health and EMF Experts

Dr. Jack Mandel, Vice President, Exponent Health Group Inc.

Dr. Harry Johnson, Department Head, Imaging Physics & Radiation Protection, CancerCare Manitoba

Dr. Margaret Fast, Medical Officer of Health, Winnipeg Regional Health Authority

Dr. Jim Popplow, Manitoba Officer of Health, Public Health Branch, Manitoba Health

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John Chan, Section Head, Transmission Design, Manitoba Hydro

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George Rempel, President, Tetr*ES* Consultants Inc.

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James Potton, CEC Technical Advisor

Rory Grewar, Commission Secretary

This report summarizes key findings of the EMF Experts Workshop that facilitated the formation of a consensus respecting the potential human health effects that might be associated with EMF exposure.

EMF RESEARCH AND FINDINGS

Although extensive studies addressing the possible effects of exposure to EMFs have been conducted over the past 30 years, interpretation of the results have often provided a "mixed message" regarding the presence or absence of a causal link between extremely low frequency (ELF) electric and magnetic fields (as produced by electric power distribution and transmission lines) and any adverse effects on human health.

After considering the state of the current research, the public health and EMF Experts in attendance at the Workshop felt that the weight of evidence is compelling. There is a definitive pattern of consistency and statistical strength in the findings of well-designed studies (namely epidemiologic and laboratory studies) over the past 30 years, particularly recently published studies (including the UK study directed by Sir Richard Doll), that support the conclusion of there being no demonstrable effect on human health from exposure to EMFs. It is the position of the Experts that the weight of evidence does not show there to be any causal association between human health and EMFs, and that there are no demonstrable adverse health-related effects resulting from exposure to these fields. The Experts considered the following key observations in reaching the consensus and in developing a position with respect to EMF effects on human health:

- the weight of evidence from studies over the past 30 years does not support the conclusion that there is an association between EMFs and health-related problems, including cancers such as leukemia. Among the key supporting studies that showed no association between EMFs and childhood leukemia were the National Cancer Institute (NCI) study (Linet *et al.* 1997; Kleinerman *et al.* 2000), and the Canadian study by McBride (*et al.* 1999);
- the results of the United Kingdom Childhood Cancer Study (UKCCS 2000) under the direction of Sir Richard Doll, in which investigators: "*...found no evidence that magnetic fields associated with the electricity supply increase risk of childhood leukemia, malignant brain (or other central nervous system) tumours, or any other childhood cancer*";
- Sir Richard Doll's statement: "*This study provides no evidence that the exposure to magnetic fields associated*

with the electricity supply in the UK increases risks for childhood leukemia, cancers of the central nervous system (CNS), or any other childhood cancer", and that there is "...now no justification for further epidemiological studies on EMF and childhood cancer in Britain" (UKCCS Investigators 2000);

- occupational epidemiology which, in over 100 studies, suggest that no causal relationship between EMFs and cancer has been established;
- laboratory research studies which strongly suggest no causal link between cancer and EMFs, even given the controlled nature of the experiments and the use of extremely high EMF exposures up to 50,000 mG (milligauss);
- the origin of the EMF concerns [i.e., studies by Wertheimer and Leeper (1979) and Savitz *et. al.* (1988)], and the methodological flaws associated with these and other studies (Green *et al.* 1999) that concluded (erroneously) that there may be a causal association between EMFs and cancer;
- the problems associated with pooled (meta) analyses; and
- the expert opinion of Dr. Jack Mandel, who supports Sir Richard Doll's position that there is no causal relationship between EMFs and cancer.

INTERNATIONAL GUIDELINES ON EMF

The Experts also considered the Guidelines regarding exposure to EMFs as prepared by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). ICNIRP is an international and independent body comprised of specialists in the field of EMF research, whose function is to provide recommendations on "health-based" guidance to limit exposures to EMF. The key points regarding these Guidelines that were considered included the following:

- the ICNIRP guidelines define the exposure limit at which a physiological response occurs (e.g., a tingling in the muscles), and not the level at which a health-related problem such as cancer would develop;
- the Guidelines do not include time-weighted averaging of human exposure to EMFs, a consideration important in the determination of a health effect, if present; and
- Dr. Harry Johnson's opinion that the ICNIRP Guidelines are overly conservative, and that he does not advocate the acceptance of ICNIRP guidelines for use as exposure limits for the public in Manitoba.

HOW CANADIAN JURISDICTIONS RESPOND TO EMF CONCERNS

The Experts also considered how other Canadian jurisdictions deal with the EMF issue. The key points regarding the EMF guidelines, policies and procedures in other Canadian provinces and territories that were considered during the Experts deliberations included relevant points made by the Federal-Provincial-Territorial Radiation Protection Committee (FPTRPC), including their 1998 position statement on EMF indicating that: "*...evidence is insufficient to conclude that electric or magnetic fields cause a risk of cancer*".

The following results from contacts with key individuals from all Canadian provinces and territories were also considered by Workshop participants:

- there are no Canadian EMF guidelines at present or in development;
- there are no avoidance policies for siting transmission lines based on EMFs;
- agencies contacted by the public regarding EMFs typically refer to existing guidelines (e.g., ICNIRP guidelines) and disseminate information on EMFs;
- Quebec's position statement on EMFs, as cited by the "Follow-up Committee on Studies on the Health Effects of High Voltage Lines" in October 2000: "*...that scientific proof of a causal relationship between electromagnetic fields emitted by high voltage lines and cancer has not yet been established, despite numerous studies...*"; and
- that EMF monitoring occurs on a site-specific and individual basis, where appropriate.

RECOMMENDATIONS

In addition to adopting a *Consensus Statement* (see attached) respecting the potential human health-related effects that might be associated with exposure to EMFs, the Experts reached agreement on a number of issues that warrant consideration and are hereby provided as recommendations for action by the Manitoba Government:

(1) That the Manitoba representative of the Federal-Provincial-Territorial Radiation Protection Committee (FPTRPC) submit the EMF Consensus Statement to the FPTRPC for their consideration during review of the 1998-position statement;
(2) That Manitoba Hydro updates its brochures and public information regarding EMFs; and
(3) That Manitoba Health develops a "reader-friendly" *Question and Answer* brochure regarding EMFs and human health, to be used for general public distribution.

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